*भारतीय मानक*
***Indian Standard***

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# एकीकृत डिजीटल टरेस्ट्रियल, सेटेलाइट, केबल टेलीविजन ( आईडीटीवी ) — विशिष्टि

# Integrated Digital Terrestrial, Satellite, Cable Television (iDTV) — Specification

ICS 33.160.25

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Audio, Video and Multimedia Systems and Equipment Sectional Committee, LITD 07

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Audio, Video and Multimedia Systems and Equipment Sectional Committee had been approved by the Electronics and Information Technology Division Council.

This standard is intended to provide updated technology on TV receiver including HD reception. It also specifies the requirement of present day technology involved with terrestrial, satellite and cable tuners.

The Committee responsible for the formulation of this standard has reviewed the provisions of the international publications listed in Annex B and has decided that these may be used in conjunction with this standard till Indian Standards on these subjects are published.

Attention has been drawn to the fact that compliance with this document may involve the use of patented technology of Dolby. The holder of this patent right has assured Bureau of Indian Standards that they are willing to negotiate licences under fair, reasonable and non-discriminatory terms and conditions with applications throughout the world.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

# INTEGRATED DIGITAL TERRESTRIAL, SATELLITE, CABLE TELEVISION (iDTV) — SPECIFICATION

## 1 SCOPE

This standard describes a baseline profile, based on open standards for a High Definition (HD) integrated Digital Television (iDTV) receiver for the reception of digital terrestrial and optionally satellite and/or cable television signals. This profile is based predominantly on Digital Video Broadcasting (DVB) standards.

## 2 REFERENCES

The standards listed in Annex A and Annex B contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A and Annex B.

## 3 REQUIREMENTS

**3.1** The iDTV shall comply mandate of DVB-T2 reception for Free-To-Air (FTA) terrestrial services. However, providing satellite and cable services reception is optional. iDTV receiver shall comply with the requirements mentioned in Sl No. i) and ii) of Table 1. In case the manufacturer is also supporting satellite and cable services reception, then the receiver shall also comply with the requirements mentioned at Sl No. iii) and Sl No. iv) of Table 1 in addition to Sl No. i) and ii) of Table 1.

**3.2** For optional pay TV services, interoperability and capability to descramble the pay TV services should be achieved by using Common Interface (CI) (*as per* Sl No. 12 and Sl No. 13 of Annex B) or CI Plus (*see* Sl No. 29 of Annex B). The iDTV may have at least one common interface slot as per Sl No. 12 or Sl No. 29 of Annex B.

**3.3** The manufacturer shall ensure compatibility/interfacing with consumer electronic equipments such as audio and video systems in the country.

### 3.4 Single Frequency Network (SFN) Operation

The iDTV shall continue to correctly demodulate and decode the DVB-T2 signal in an SFN environment when there are two or more signals of equal amplitude present at the receiver input, provided the maximum time difference between the signals is less than 90 percent of the guard interval.

### 3.5 Specifications

The specifications for the various features and capabilities for the iDTV receiver shall be as given in Table 1.

### 3.6 Performance Requirements

The requirements for various performance parameters for the iDTV receiver shall be as given in Table 2.

### 3.7 Safety Requirements

The safety requirements of iDTV receivers shall conform to IS 616.

### 3.8 Electromagnetic Compatibility (EMC) Requirements

The EMC requirements of the iDTV receiver shall conform to IS 6873 (Part 3).

## 4 MARKING

**4.1** Each iDTV receiver shall be legibly and indelibly marked with at least the following information:

a) Manufacturer's name or trademark (if any);
b) Model designation and serial number;
c) Country of manufacture;
d) Input supply voltage and frequency (If an external power adapter is provided, d.c. input voltage, polarity and current/wattage shall be marked on the TV and a.c. input voltage, frequency and current/wattage shall be marked on the power adapter);
e) Power consumption;
f) Terrestrial input terminal (or cable/satellite input terminals, if available);
g) All connectors

**4.2** The UI of the television shall display the type(s) of tuner(s) present and may display serial number of the iDTV receiver unit.

### 4.3 BIS Certification Marking

The iDTV receiver may also be marked with the Standard Mark.

**4.3.1** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards* Act, 1986 and the Rules and Regulation made thereunder. The details of conditions under which a license for the use of Standard Mark may be granted to manufacturers and producers may be obtained from the Bureau of Indian Standards.

## 5 OPERATING LIFE TEST

The iDTV receiver shall be subjected to operating life test consisting of 168h of operation using five sample sets, at voltage (90-270 V a.c.) and at ambient temperature of 45 ± 5°C. At the end of the operating life duration, iDTV shall meet the requirements mentioned in **3.6**.

### Table 1 Specifications

(*Clauses* 3.1 *and* 3.5)

| Sl No.<br>(1) | Specification<br>(2) | Mandatory<br>(3) | Optional<br>(4) |
|---|---|---|---|
| i) | **BASIC RECEIVER PROFILE:** | | |
| a) | Hardware specification | The processing power and memory configuration of the receiver must be suitable for the routine operation of digital reception (DVB-T2, and optionally DVB-C and/or DVB- S2) and the provision of the routine replacement of all software *via* through-the-air-download | — |
| b) | Decompression and decoding of SDTV video | Capability to decompress and decode SDTV signals compressed using MPEG-2 MP@ML (*see* Sl No. 5 and Sl No. 6 of Annex B) and MPEG-4 Part 10 AVC MP @ L3 (*see* Sl No. 7 of Annex B) | — |
| c) | Decompression and decoding of HDTV video | a) Capability to decompress and decode HDTV signals compressed using MPEG-4 Part 10 AVC HP@L4 (*see* Sl No. 7 of Annex B) | Capability to decompress and decode HDTV signals compressed using MPEG-2 MP@HL (*see* Sl No. 5 and Sl No. 6 of Annex B) |
| | | b) The iDTV receiver should be capable of decoding both 1080i and 720p formats and up scaling/down scaling it to the best format supported by it | |
| d) | Decompression and decoding of audio | Capability to,<br>a) decompress, decode according to metadata and down-mix to stereo for multichannel audio, the following formats:<br>1) MPEG-1 Layer 2 (*see* Sl No. 8 of Annex B)<br>2) E-AC-3 (*see* Sl No. 9 and Sl No. 19 of Annex B)<br>3) AC-3 (*see* Sl No. 9 and Sl No. 19 of Annex B) | Capability to,<br>a) decompress, decode MPEG-4 HE AAC (mono and stereo) |
| | | b) pass through AC-3 (*see* Sl No. 19 of Annex B) over S/PDIF output interface | b) pass through the following multi-channel formats:<br>1) E-AC-3 over HDMI ARC interface<br>2) AC-3 over HDMI ARC interface<br>3) MPEG-4 HEAAC 5.1 over HDMI ARC and S/PDIF output interface |
| | | c) Transcode E-AC-3 input formats to AC-3 (*see* Sl No. 9 and Sl No. 19 of Annex B) for output via S/PDIF output interface | c) Transcode E-AC-3 to AC-3 for output *via* ARC over HDMI |
| | | d) provide aligned loudness on all audio outputs and for playback of all received audio formats: | d) Support dual audio decoding for the associated service.<br>If dual audio decoding is implemented, it, |
| | | 1) Set the audio decoder to operate in RF mode, with a subsequent 3 dB attenuation for -23LUFS stereo outputs (for example, analogue) and playback over internal speakers | 1) shall decompress and decode a secondary E-AC-3 audio service (for example, audio description) simultaneously with the main E-AC-3 audio service decoder based on separate PIDs. |
| | | 2) Apply 8 dB attenuation to decoded audio for -31LUFS multichannel bitstream capable outputs for example | 2) shall mix the audio together based on mixing |

**Table 1 —** (*Continued*)

| (1) | (2) | (3) | (4) |
|---|---|---|---|
| | | S/PDIF (*see* Sl No. 20 and Sl No. 21 of Annex B) | metadata (*see* Sl No. 19 of Annex B).<br>3) shall be capable of outputting the mixed audio as stereo PCM audio and playing back the same over internal speakers and over an independent output interface for example, headphones<br>4) shall be capable of outputting the mixed audio as a re-encoded 5.1 AC-3 audio bitstream for output over S/PDIF or HDMI<br>5) shall provide a user control of balance between main and secondary audio<br>6) should provide an audio alert to the user to indicate the detection and presentation of a valid secondary audio service<br>7) should provide the option to output the mixed audio over one physical audio output (for example, headphones), and the main audio over another physical audio output (for example, HDMI and internal speakers) simultaneously |
| e) | Active format descriptors | Ability to handle 16 : 9 widescreen and 4 : 3 picture format changes as detailed in the 'transmission rules' including support for correct aspect ratio and Active Format Descriptors. (*see* Sl No. 9 of Annex B) | — |
| f) | Subtitle streams | Capability to receive and process Subtitle streams (*see* Sl No. 16 and Sl No. 17 of Annex B) | DVB subtitles shall be invoked from a suitable labeled remote control key, which is always under the control of the receiver |
| g) | Teletext | — | The iDTV receiver shall include a Teletext decoder (*as per* Sl No. 24 of Annex B) including up to Teletext Ver 1.5. A suitable remote control button should be provided to launch the teletext OSD display |
| h) | Multi-language support | The receiver is to at least support the setting of a primary and secondary audio language based on the language descriptors associated with the audio-streams transport stream (*see* Sl No. 5 and Sl No. 6 of Annex B). If the primary language is not present then the receiver shall automatically select the secondary audio language. When the secondary audio language is also not available then the country default language shall be selected. When the default language is also not available then the receiver shall select the first audio PID appearing in the PMT elementary stream loop | — |
| j) | Audio description | — | iDTV receivers that are capable of presenting audio description should provide at least the minimum user controls. (*as per* Sl No. 9 of Annex B) |
| k) | Broadcast mixed audio description | In addition to multi-language support specifications | — |

**Table 1 — (*Continued*)**

| (1) | (2) | (3) | (4) |
|---|---|---|---|
| | | mentioned at Sl No. i) h) of Table 1 specified above, iDTV receivers shall provide a user preference to enable broadcast mixed audio description | |
| m) | Service demultiplexing | Capability to receive and process SI (Service Informatin) (*see* Sl No. 15 and Sl No. 16 of Annex B) | — |
| n) | Data services | Capability to receive and process data streams (*see* Sl No. 10 and Sl No. 11 of Annex B) | — |
| p) | OSD | Video layer (a full colour layer displaying the output of the MPEG video decoder) Layer to support:<br>a) Y=8 bit, $C_B$=8 bit, $C_R$=8 bit<br>b) Chroma to be sub-sampled to either 4 : 2 : 0 or 4 : 2 : 2<br>c) Alpha blending need not be supported, but the layer may be shown or hidden.<br>OSD/Graphics Layer (an 8-bit palletized layer which can display region-based graphics)<br>1) each CLUT palette entry to support: Y= 6 bit, $C_B$= 4 bit, $C_R$= 4 bit<br>2) chroma to be sub-sampled to either 4 : 2 : 0 or 4 : 2 : 2<br>3) alpha blending to be either 6 bit across the entire layer, or 2 bit per pixel | —<br>— |
| q) | Receiver character set | The main character set of the receiver shall be the character code table 00 – Latin Alphabet (*as per* Sl No. 28 of Annex B) | — |
| r) | Electronic service guide (ESG) 'Now/Next' | 'Now/Next' information for use in an on-screen banner shall be derived using information from DVB SI EIT p/f tables (*see* Sl No. 15 of Annex B)<br>The actual appearance of the Now/Next banner is left to the manufacturer but it is recommended that the following information be displayed in the bottom third of the screen:<br>a) Current time,<br>b) Start time of now and next program,<br>c) End time of now and next program,<br>d) Logical channel number (*see* Sl No. 30 of Annex B)<br>e) Channel name and<br>f) Date | a) The ESG "Now and next" shall be displayed when the user changes channels for approximately 2 s and shall also be launched using the *i* (info) button on the remote control<br>b) ESG 'Schedule': An Electronic Program Guide (EPG) application may be provided using EIT schedule information from the SI |
| s) | Time | The receiver shall have a real time clock / calendar running continuously (*see* Sl No. 15 of Annex B). The clock shall be updated by the incoming TDT and TOT table in the SI . The time displayed by the receiver shall be the local time | — |
| t) | Network evolution | The receiver shall support dynamic SI in order to automatically detect and suitably handle service changes without the need for user intervention.This should be done, for example, by reference to the SDT and/or NIT version numbers. Changes should be processed within 24h of the presence of correct SI signaling. This shall be with minimal viewer disturbance | — |
| u) | iDTV output | — | The iDTV receiver may offer output(s) for connection to a recording device. The receiver should manage content protection on these outputs (*see* Sl No. 12 and Sl No. 13 of Annex B). |
| ii) | **DIGITAL TERRESTRIAL RECEPTION (Mandatory):** | | |
| a) | Demodulation and FEC decoding | Capability to demodulate and decode DTT signals, channel coded and modulated as specified in DVB-T2 standards (*see* Sl No. 1, Sl No. 2, Sl No. 4 of Annex B) | iDTV receiver may support DVB-T2 Lite |
| b) | Receiver installation | The receiver shall perform an automatic scan based on the NIT information or a linear scan of the frequency range defined in Table 2, Sl No. iii). It shall find all available DVB services. Before an automatic search, the receiver shall delete all services currently held in the service list. | |

**Table 1 — (*Continued*)**

| (1) | (2) | (3) | (4) |
|---|---|---|---|
|  |  | In addition to an automatic search it shall be possible to perform a manual search where suitable tuning information is provided by the user. Any new services found shall be added to the service list. No duplicated services shall be displayed in the service list | — |
| c) | Services available | After the iDTV receiver installation, all services that shall be received in that geographic region should be available to the viewer. The actual services being broadcast may subsequently change | — |
| d) | Scanning for terrestrial services | The receiver shall be capable of automatically detecting changes in the services configuration of each broadcast transport stream provided that such changes are implemented by the broadcaster in accordance to the 'transmission rules' and are compliant with the DVB-SI standards. The intent of this requirement is to allow the broadcaster to vary the services offering within the relevant broadcast transport stream(s) without the viewer needing to rescan the receiver | — |
| e) | Logical channel numbers (LCNs) for terrestrial services | The receiver shall detect and correctly process Logical Channel Number (LCN). The receiver shall locate, store and handle services with Logical Channel Numbers (LCNs) within the ranges of 1 to 799 | — |
| f) | Duplicate terrestrial services | If duplicate instances of a service (that is, services that have been allocated the same LCN) are received from different transmitters, then the service with the highest received quality shall be placed in the correct LCN position | — |
| g) | Selection *via* service list | The service list displayed immediately following a full automatic scan must present services in ascending LCN order | — |
| h) | Selection *via* numeric entry | Selection of a service using numeric entry shall always select a service with that LCN regardless of any viewer favourites | — |
| j) | Hidden services | Services marked as 'hidden' in the LCN descriptor or where the LCN is 0 shall not appear in the service list presented to the viewer. The receiver shall locate conflict services and store the same within the range 800 to 999 | — |
| k) | Maximum RF input signal | -25 dBm | — |
| m) | FEFs | iDTV receivers shall not malfunction in the presence of FEFs | The iDTV receiver should be able to decode FEFs |
| n) | FFT size | Receiver shall be capable of detecting and presenting services transmitted using all DVB-T2 FFT sizes, that is, 1k, 2k, 4k, 8k, 16k and 32k and the applicable extended modes | — |
| p) | Constellations | Receiver shall be capable of detecting and presenting services transmitted using all DVB-T2 modulation constellations, that is, QPSK, 16 QAM, 64 QAM and 256 QAM including their rotated constellations | — |
| q) | Code rates | Receiver shall be capable of detecting and presenting services transmitted using all DVB-T2 code rates, that is, 1/2, 3/5, 2/3, 3/4, 4/5 and 5/6 | — |
| r) | Guard interval | Receiver shall be capable of detecting and presenting services transmitted using all DVB-T2 guard intervals, that is, 1/128, 1/32, 1/16, 19/256, 1/8, 19/128 and 1/4 | — |
| s) | Pilot patterns | The receiver shall be capable of the correct reception and decoding of signals utilising the following Pilot Patterns: PP1, PP2, PP3, PP4, PP5, PP6, and PP7 | The receiver shall be capable of the correct reception and decoding of signals utilising the pilot pattern PP8. |
| t) | Time frequency slicing | The receiver shall not be required to handle TFS mode |  |
| u) | SFN operation | The receiver shall correctly operate in the presence of two static echoes, that is, 2 paths, with a relative delay in a range of 1.95 µs and 0.95 times the duration of the guard interval, independently of the value of the amplitude and of the relative phases. This is assumed to be the minimum requirement for operation in a Single Frequency Network (*see* Sl No. 4 of Annex B) | —<br>— |
| v) | Multiple physical layer pipe (PLP)s | The receiver shall be able to receive DVB-T2 transmissions consisting of a single PLP and transmissions | — |

**Table 1 — (*Continued*)**

| (1) | (2) | (3) | (4) |
|---|---|---|---|
| | | consisting of a common PLP together with one or more data PLPs (*see* Sl No. 2 of Annex B).In the case of multiple PLP transmissions, the receiver shall only be expected to extract and present a single selected service from a common PLP and data PLP combination (*see* Sl No. 2 and Sl No. 4 of Annex B). | |
| iii) | **DIGITAL SATELLITE RECEPTION (Optional):** | | |
| a) | Demodulation and FEC decoding | Capability to demodulate and decode satellite signals, channel coded and modulated (*see* Sl No. 3 and Sl No. 13 of Annex B) | — |
| b) | Receiver installation | During iDTV receiver installation the user shall be able to navigate to the satellite 'home' transponder. This may be done by entering the tuning parameters of the transponder manually or by selection of the satellite from a list or by performing a linear scan of all frequencies and polarisations. The iDTV receiver shall use the SDTACTUAL, SDTOTHER and NITACTUAL to create a service list | — |
| c) | Services available | After iDTV receiver installation, all services that may be received shall be available to the viewer. The actual services being broadcast may subsequently change [*see* i) t) of Table 1] | — |
| d) | Selection *via* service list | The service list displayed immediately following a full automatic scan must present services in ascending LCN order | — |
| e) | Selection *via* numeric entry | Selection of a service using numeric entry shall always select a service with that LCN regardless of any viewer favourites | —<br>— |
| f) | Hidden services | Services marked as 'hidden' in the LCN descriptor shall not appear in the service list presented to the viewer. Services may also be identified as not selectable by numeric entry in a similar way. The receiver shall locate conflict services and store the same | — |
| g) | Logical channel number for satellite services | The iDTV receiver service list shall be managed by Logical Channel Number Descriptors (LCN) carried by the SDTs/NIT. The receiver shall locate, store and handle services with Logical Channel Numbers (LCNs) | — |
| h) | RF input signal | -60 dBm to -25 dBm | — |
| j) | LNB supply current | Minimum 300mA | — |
| k) | LNB supply voltage | Vertical polarisation : 13 V d.c.<br>Horizontal polarisation : 18 V d.c. | — |
| m) | LNB control | The following control of the LNB shall be provided:<br>a) Low band / High band switching<br>1) Low Band : 10.70 – 11.70 GHz<br>2) High Band : 11.70 – 12.75 GHz<br>b) Polarization : horizontal / vertical selection | — |
| n) | Modulation parameters for DVB-S2 | A*s* per Sl No. 3 of Annex B | — |
| iv) | **DIGITAL CABLE RECEPTION (Optional)** | | |
| a) | Demodulation and FEC decoding | *See* IS 16128 | — |
| b) | Modulation | *See* IS 16128 | — |
| c) | Receiver noise performance | *See* IS 16128 | — |
| v) | **CONNECTORS** | | |
| a) | Interfaces, Connectors | a) Terrestrial/Cable Input: 75 Ω Impedance female Connector (*see* Sl No. 26 of Annex B)<br>b) Inputs :<br>1) Analog Video: RCA Type : Yellow<br>2) Analog Audio: RCA Stereo : L (White), R (Red)<br>3) One HDMI version 1.3a port<br>i) Shall pass through HD video as per c) of Sl No. i) of Table 1 [1920 x 1080 Interlaced (1080i); 1280 x 720 Progressive (720p)] through the HDMI interface<br>ii) Shall pass through SD [Standard Definition] or down-scaled HD [High Definition] video at 720 x 576 Interlaced (576i) as per c) of Sl No. i) specified above through the HDMI interface<br>c) Output :<br>1) Coaxial or Optical S/PDIF output connector (*see* | a) Additional HDMI inputs and/or outputs<br>b) HDMI inputs having Audio Return Channel (ARC)<br>1) shall pass through AC-3 input audio bit streams over HDMI ARC<br>2) shall output AC-3 audio bitstreams transcoded from E-AC-3 input audio bitstreams over HDMI ARC<br>3) shall output stereo PCM over HDMI ARC from decoded stereo audio inputs and down |

### Table 1 — (*Concluded*)

| (1) | (2) | (3) | (4) |
|---|---|---|---|
| | | Sl No. 25 of Annex B)<br>i) Shall pass through AC-3 input audio bitstreams<br>ii) Shall output AC-3 audio bitstreams transcoded from E-AC-3<br>iii) Shall output stereo PCM from decoded stereo audio inputs and down mixed stereo audio from multichannel audio input<br>d) For cable and satellite receivers : DVB-CI (Common interface) Slot (*see* Sl No. 12 and Sl No. 13 of Annex B)<br>e) For Satellite receivers : Satellite Input: 75Ω Female Type (*see* Sl No. 27 of Annex B) | mix stereo audio from multichannel audio input<br>c) Analog Audio : RCA Stereo : L (White), R (Red)<br>d) Component (Y, Pb, Pr) Video<br>e) USB 2.0 Ports<br>f) RJ11 (for PSTN Modem)<br>g) RJ45 for fast ethernet connection<br>h) 3.5mm Headphone Jack for stereo audio output or Audio Description and Broadcast Mix Audio Description as per Clause j) and k) of Sl No. i) of Table 1 above<br>j) 15-pin D-sub female connector for PC connectivity<br>k) DVI-I connector for PC connectivity<br>m) AC-3 audio bitstreams transcoded from MPEG-4 HE AAC input audio bitstreams should be output *via* HDMI ARC and S/PDIF output interface<br>n) ARC capable HDMI inputs should pass through native, input audio bitstreams |
| **vi)** | **MAINTENANCE AND UPGRADE:** | | |
| | Automatic software upgrade mechanism | The software upgrade mechanism shall be DVB SSU, to at least the simple profile (*as per* Sl No. 14 of Annex B) is required. | RS 232C or USB port or RJ 45 Ethernet for uploading control software and/or additional services |
| **vii)** | **USER INFORMATION:** | | |
| | a) Remote control | A remote control is to be supplied with the receiver. The manufacture is free to design the remote control. The following remote control keys are required:<br>All other buttons as D Book Chapter 25 'Remote Control Key Labeling'<br>a) Keys 0-9<br>b) Power - turns the iDTV receiver on and off<br>c) Program up/down - keys to switch between programs<br>d) Volume up/down - keys to adjust the volume output level<br>e) Subtitle - this key displays the subtitle as per Sl No. f) of i) of Table 1 above<br>f) Info - This key displays additional information if available<br>g) EPG/Guide - this key displays an Electronic Program Guide<br>h) Back - this function exits from the current menu or OSD and returns to the previous state<br>j) 4 Programmable colour coded keys<br>or<br>should have any other interface for above functionality | — |
| b) | Easy to use and simple documentation | iDTV receivers shall be simple to set up and operate and be provided with clear easy to understand user documentation in line with that requirement. | —<br>— |
| c) | Support package | The following peripheral items shall be included within a baseline iDTV receiver package :<br>a) Remote control and batteries<br>b) An easy to understand user manual | A basic status check should be invoked by a menu driven option or a user selected key. The OSD is to present the reception quality, signal strength strength indicator and Channel ID |

## Table 2 Performance Requirements

(*Clause* 3.6)

| Sl No.<br>(1) | Specifications / Parameters<br>(2) | Mandatory Values<br>(3) | Optional<br>(4) |
|---|---|---|---|
| i) | Electrical specifications : | | — |
| | a) Input voltage range | a) 110 – 240 V a.c. | |
| | b) Frequency | b) 50 Hz ± 2 percent | |
| ii) | RF characteristics to be supported by the iDTV receiver | a) As per DVB-T2 standards for terrestrial signal<br>b) As per DVB-C standard for cable signal (*see* Sl. No. 31 of Annex B)<br>c) As per DVB-S2 standard for satellite signal | — |
| iii) | DVB-T2 tuner performance characteristics | | — |
| | a) Input level per carrier | a) To be calculated using $P_{s\ min} = P_n + NF + C/N$<br>where $P_n$ = Noise floor in dBm;<br>NF = Receiver Noise figure in dBm;<br>and C/N = carrier to noise ratio for a given reception condition in dBm.<br>$P_n$ = -113.8 + 10 log (Channel BW in MHz)<br>(For C/N values refer Sl No. 18 of Annex B) | |
| | b) Input frequency range | b) 174 to 230 MHz VHF Band III<br>470 to 582 MHz UHF Band IV<br>582 to 862 MHz UHF Band V | |
| | c) Channel width | c) VHF : 7 Mhz<br>UHF : 8 Mhz | |
| | d) RF input impedance | d) 75Ω | |
| iv) | Cable iDTV<br>RF and channel tuner performance characteristics to be supported by the receiver :<br>a) System<br>b) Modulation<br>c) RF carrier signal level<br>d) Carrier level difference between distributed TV channels (47 to 862 MHz range)<br>e) Amplitude response within a TV channel<br>f) Lowest carrier to interference ratio<br>g) Cross modulation<br>h) Digital video RF characteristics<br>j) Carrier/Noise (C/N) ratio<br>k) Input frequency range<br>m) RF input channel bandwidth<br>n) RF input impedance<br>o) RF input return loss<br>p) Frequency assignment download | *see* IS 16128 | — |
| v) | Satellite iDTV : DVB-S2 tuner performance characteristics | | — |
| | a) Input level per carrier | a) Required C/N for QEF<br>(BER = $10^{-10}$ to $10^{-11}$)<br>**Mode** **Pilots** **C/N (dB)**<br>QPSK 1/2 No 2.0<br>QPSK 3/5 No 3.2<br>QPSK 2/3 No 4.1<br>QPSK3/4 No 5.0<br>QPSK 4/5 No 5.7<br>QPSK 5/6 No 6.2<br>QPSK 8/9 No 7.2<br>QPSK 9/10 No 7.4<br>8PSK 3/5 Yes 6.5<br>8PSK 2/3 Yes 7.6<br>8PSK 3/4 Yes 8.9<br>8PSK 5/6 Yes 10.4<br>8PSK 8/9 Yes 11.7<br>8PSK 9/10 No 12.0 | |
| | b) Input frequency range | b) 950 to 2150 MHz | |
| | c) RF input impedance | c) 75 Ω | |
| vi) | Remote control | Mandatory | — |
| vii) | Operating ambient temperature range | 5°C to 40°C | — |
| viii) | Operating humidity range | Up to 90 percent (non-condensing) | — |

# ANNEX A

(*Clause* 2)

## LIST OF REFERRED INDIAN STANDARDS

| *IS No.* | *Title* |
|---|---|
| 616 : 2010 | Audio, video and similar electronic apparatus — safety requirements (*fourth revision*) |
| 6873 (Part 3) : 1999 | Limits and methods of measurement of radio disturbance characteristics: Part 3 Sound and television broadcast receivers and associated equipment (*first revision*) |
| 16128 : 2014 | Digital set top box for MPEG 4 digital cable TV services — Specification |

# ANNEX B

(*Clause* 2)

## LIST OF REFFERED INTERNATIONAL STANDARDS/PUBLICATIONS

| *Sl No.* | *International Standards/ Publications* | *Title* |
|---|---|---|
| 1 | EN TR 101 190 Ver 1.3.2 | Implementation Guidelines for DVB Terrestrial Services; Transmission aspects |
| 2 | EN 302 755 Ver 1.3.1 | Framing structure channel coding and modulation for a second generation digital terrestrial broadcasting system (DVB-T2) |
| 3 | EN 302 307 Ver 1.2.1 | Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications (DVB-S2) |
| 4 | ETSI TS 102 773 Ver 1.3.1 | Modulation Interface for a second generation digital terrestrial television broadcasting system |
| 5 | ISO/IEC 13818-1 : 2007 | Information technology — Generic coding of moving pictures and associated audio information” Part 1: Systems (MPEG 2) |
| 6 | ISO/ IEC 13818-2 : 2000 | Information technology – Generic coding of moving pictures and associated audio information Part 2 Video Coding |
| 7 | ISO/IEC 14496-15 : 2010 | Information technology — Coding of audio-visual objects : Part 15 Advanced Video Coding (MPEG-4 Part 10 AVC) (AVC File Format) |
| 8 | ISO/ IEC 11172-3 : 1993 | Information technology — Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s : Part 3 Audio: MPEG-1 Audio Layer II |
| 9 | ETSI TS 101 154 Ver 1.10.1 | Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream. |
| 10 | ETSI EN 301 192 Ver 1.5.1 | Digital Video Broadcasting (DVB); DVB specification for data broadcasting |
| 11 | ETSI TR 101 202 Ver 1.2.1 | Digital Video Broadcasting (DVB); Implementation guidelines for Data Broadcasting |
| 12 | EN 50221 Ver 1 | Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications and ETR 289 Ver 1 Support for use of scrambling and Conditional Access (CA) within digital broadcasting systems |

| *Sl No.* | *International Standards/ Publications* | *Title* |
|---|---|---|
| 13 | ETSI TS 101 699 Ver 1.1.1 | Extensions to the Common Interface Specification |
| 14 | ETSI TS 102 006 Ver 1.3.2 | Specification for System Software Update in DVB Systems |
| 15 | ETSI EN 300 468 Ver 1.13.1 | Specifications for Service Information (SI) in DVB systems |
| 16 | ETSI TS 101 211 Ver 1.10.1 | Guidelines on implementation and usage of Service Information (SI) in DVB systems |
| 17 | ETSI EN 300 743 Ver 1.4.1 | Subtitling Systems |
| 18 | ETSI TS 102 831 Ver 1.1.1 | Digital Video Broadcasting (DVB); Implementation guidelines for a second generation digital terrestrial television broadcasting system (DVB-T2) |
| 19 | ETSI TS 102 366 Ver 1.2.1 | Digital Audio Compression (AC-3, Enhanced AC-3) Standard |
| 20 | ITU-R BS.1770-2 | Algorithms to measure audio programme loudness and true-peak audio level |
| 21 | EBU-R 128 | Loudness normalization and permitted maximum level of audio signals |
| 22 | ETSI ES 202 184 Ver 1.1.1 (2004-11) | MHEG-5 Broadcast Profile |
| 23 | ISO/IEC 13522-5 : 1997 | Information technology — Coding of multimedia and hypermedia information - Part 5: Support for base-level interactive applications |
| 24 | ETSI EN 300 706 | Enhanced Teletext specification |
| 25 | IEC 61937 | Digital audio - Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 |
| 26 | IEC 61169-2 | Radio-frequency coaxial connectors of type 9,52 Part 2 |
| 27 | IEC 61169-24 | Radio-frequency connectors — Part 24: Sectional specification — Radio frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable networks (type F) |
| 28 | ISO/IEC 6937 | Information technology — Coded graphic character set for text communication — Latin alphabet |
| 29 | ETSI TS 103 205 Ver 1.1.1 | Extensions to the CI Plus™ Specifications |
| 30 | IEC 62216 | Logical channel numbers for Terrestrial services |
| 31 | EN 300 429 Ver 1.2.1 | Framing structure, channel coding and modulator for cable systems (DVB-C) |

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**Amendments Issued Since Publication**

| Amend No. | Date of Issue | Text Affected |
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